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GB A 2114057 EP 0097528  
GB A 2087938 EP 0078120  
GB A 2034637 EP 0046673  
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(58) Field of search  
B6F  
B6C

## (54) Curing printed images

(57) A recording device comprises an image forming means e.g ink jets 4 for forming images with ink on a recording member 1 having an ink receiving layer and an energy applying means 9, e.g an ultraviolet heater for curing said ink receiving layer after forming the image thereon.

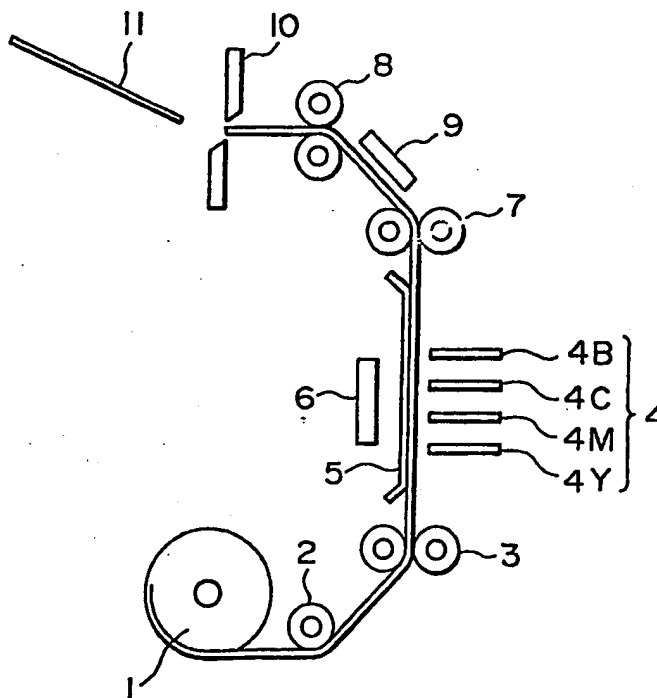


FIG. 1

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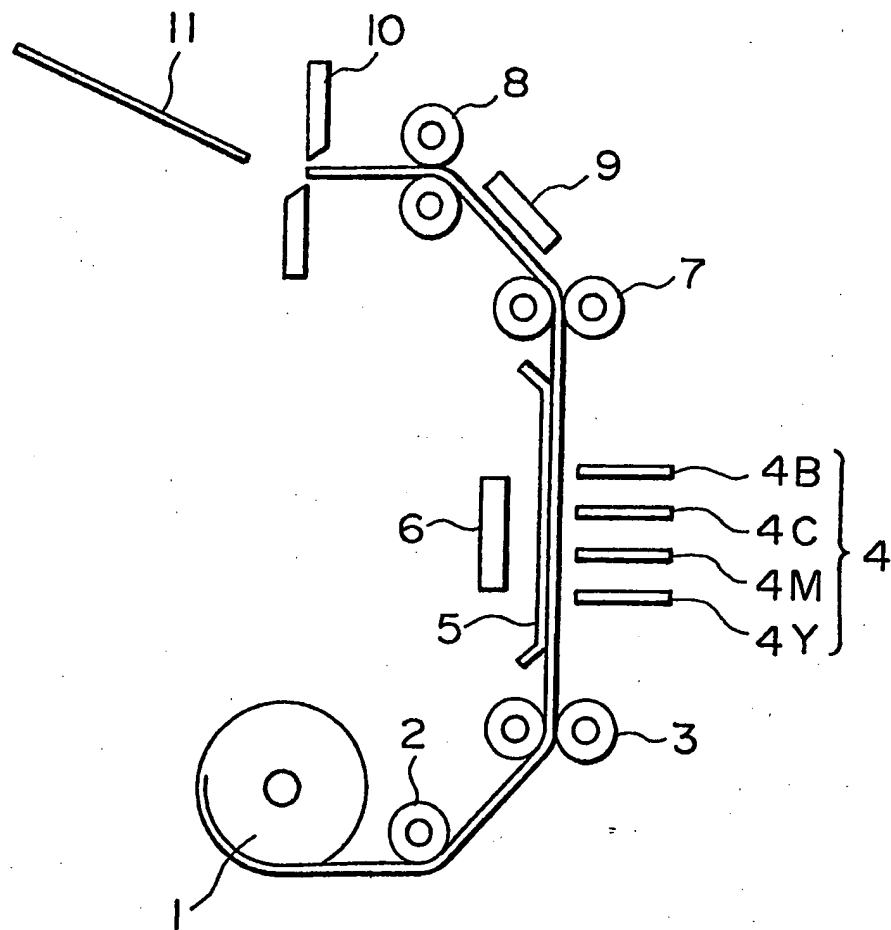


FIG. 1

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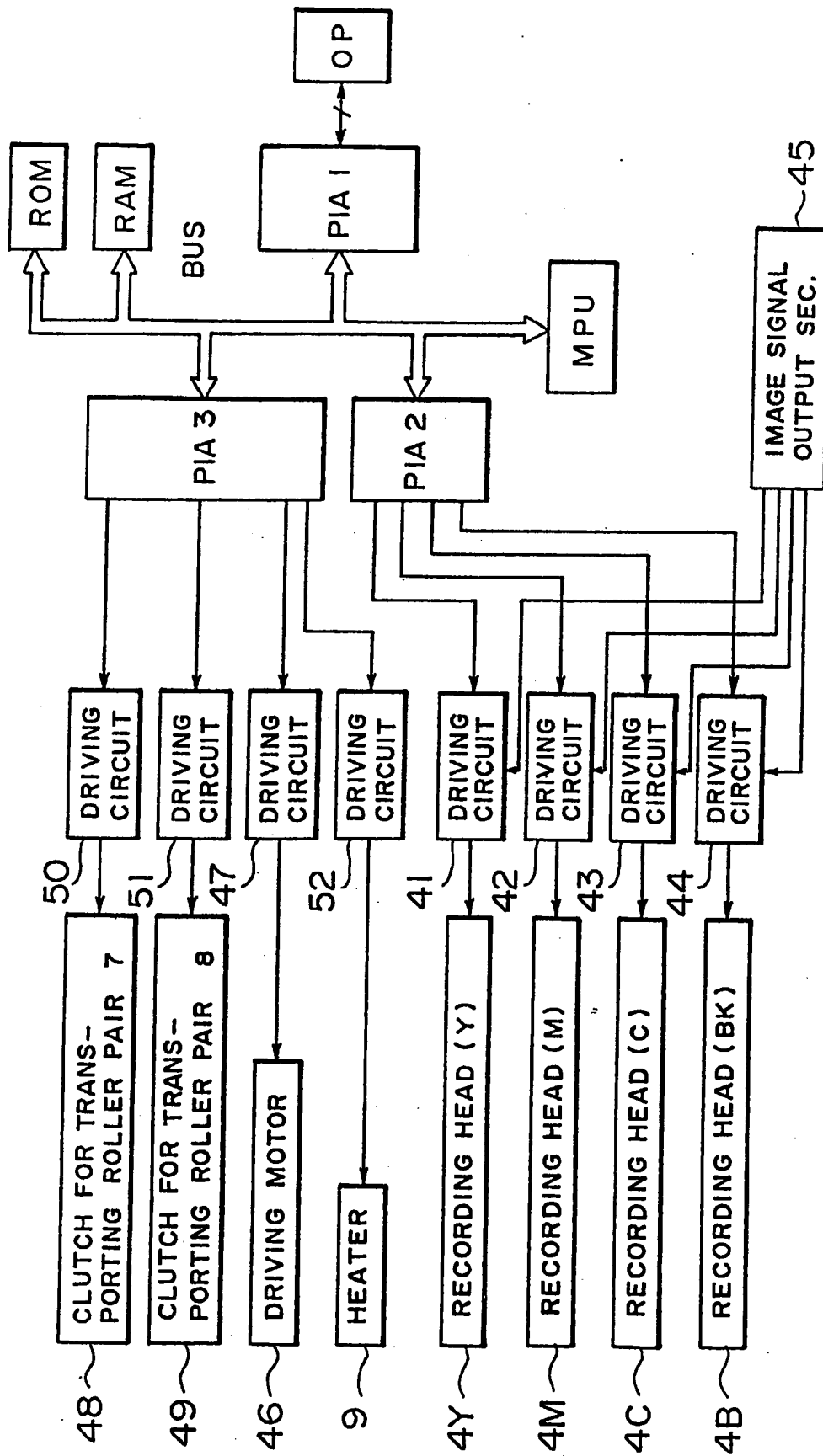


FIG. 2

## SPECIFICATION

## Recording device

5 *Background of the invention*

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*Field of the invention*

The present invention relates to a recording device having a function for applying energy onto a recorded member after forming an image thereon according to an ink jet process, and more particularly, to an improved device capable of preparing an original suitably used in an overhead projector (hereinafter referred to as "OHP").

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*Description of the prior art*

Generally, a transparent resin film, such as polyester film and the like, suitable for an OHP original, is nonabsorbable for ink thereby causing unacceptable fixed image, therefore, it is not suitable for OHP original when an ink jet process is utilized for image forming. In order to overcome such disadvantages, a transparent resin film having an affinity for ink may be used as an ink receiving layer, but is deteriorated with water or moisture and does not possess sufficient properties, for example, mechanical strength. Thus, the prior known OHP original of a transparent resin film on which an image is formed, has drawbacks, such as a low grade of formed image, partial lack of surface of an ink receiving layer due to peeling off and the like.

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*Summary of the invention*

The present invention aims to provide an improved recording device which comprises means for applying an energy for curing an ink receiving layer after forming an image to improve properties of the ink receiving layer such as mechanical strength, water resistance, solvent resistance durability etc, and to form a high quality image without causing partial peeling off.

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According to the present invention, there is provided a recording device which comprises an image forming means for forming images with ink on a recording member having an ink receiving layer, and an energy applying means for curing said ink receiving layer after forming the image thereon.

30 *Brief description of the drawings*

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Figure 1 illustrates a multi-color ink jet printer as an embodiment according to the present invention.

Figure 2 shows a diagram of controlling system for operating the printer of Figure 1.

*Description of the preferred embodiment*

35 The example of the present invention is explained in detail referring to the drawings according to the present invention.

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In Figure 1, numeral 1 is a long length recording paper wound in a form of roll and is used as an OHP original after forming an image thereon. According to the present example, the recording member which is made of transparent resin film has an affinity for ink, and provides an ink receiving layer on a surface which may be cured by applying cure energy thereon.

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Recording member 1 is drawn and supplied through a guide roller 2 by driving transporting roller pairs 7 and 8, and is transferred through transporting roller pair 3 to a recording site at which an ink jet recording head 4 is positioned. A porous guide plate 5 is also provided at the recording site. Recording member 1 is transferred along the guide plate 5 while slide-contacting thereon by suction with an exhaust fan 6, thereby maintaining flatness of the recording member to suitably hold the distance between the surface of the recording member and the ink jet recording head 4.

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Ink jet recording head 4 has multiple ink jet recording heads 4Y, 4M, 4C and 4B which eject color inks such as yellow, magenta, cyan and black, respectively, and reproduce color images on recording member 1 corresponding to image signals from an image reading means (not shown). These recording heads are composed of a so-called full multiheads, positioned in nearly perpendicular to the direction of transporting recording member, that is, perpendicular to the paper face of the drawing.

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Recording member 1 having a recording face on which color image is recorded is transferred to transporting roller pair 8 by driving the transporting roller pair 7. In the vicinity of a transporting path of the recording member and between two roller pairs 7 and 8, energy applying means 9, such as means for applying radiation, for example ultraviolet rays, heating means, and the like, is provided so as to cure said ink receiving layer on which the image has been formed. The recording member is transferred while receiving an energy from energy applying means 9. Type of the projected energy may be chosen depending on a nature of the ink receiving layer to be used in recording. As the result, the ink receiving layer formed on recording surface of recording member 1 is cured and the ink which is ejected from the recording head 4 and attached to said ink receiving layer is brought into a complete fixed state.

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Thus, recording member 1 on which the printed image is completely fixed is further transferred to a cutting site at which cutter 10 is positioned through transporting roller pair 8, and cut it into a desired segment. Finished recording member 11 thus obtained may be used as an OHP original.

In Figure 2, MPU is a microprocessor for drive-controlling each device; ROM is a read-only-memory storing control program therein; RAM is a random access memory of free reading and writing; BUS is a

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passage of receiving and transmitting data and control signal from device to device; and OP is an operation section for designating and displaying recording conditions such as a recording member, and a concentration of recording image. The input signal from OP is supplied to microprocessor MPU through peripheral interface adapter PIA 1 and BUS. 4Y, 4M, 4C and 4B are aforementioned recording heads, respectively; and 41, 42, 43 and 44 are driving circuits for driving recording heads 4Y, 4M, 4C and 4B, respectively.

An image signal corresponding to an image information which is read out from image reading means (not shown) is supplied to these driving circuits 41 to 44. On the other hand, a driving signal from the microprocessor MPU is supplied to driving circuits 41 to 44 by way of the adapter PIA 2. The each of the heads 4Y to 4B is energized by individual driving circuits 41 to 44 according to the image signal and driving signal to eject each color ink onto recording member 1, thereby forming an image thereon.

Furthermore in Figure 2, numeral 46 is a driving motor for actuating roller pairs 7 and 8, 47 is a driving circuit for on-off controlling of driving motor 46, and 48 and 49 are clutches for transmitting a driving force of driving motor 46 to roller pairs 7 and 8, respectively. 50 and 51 are driving circuits for on-off control of these clutches 48 and 49, respectively, and 52 is a driving circuit for on-off control of energy applying means 9, for example, ultraviolet ray irradiating device.

The on-off control of each clutch 48 or 49, and energy applying means 9, are carried out by respective driving circuits 50, 51 and 52 corresponding to a control signal from microprocessor MPU through peripheral interface adapter PIA 3.

As energy applying means 9 disclosed in the above example, the device having function similar to radiation projecting devices such as ultraviolet ray projecting device, electron beam projecting device, and the like, may be used, and a heat energy applying means such as a heater and heating roller containing heater therein may be used in place of the above mentioned devices when the ink receiving layer comprises a thermosetting material.

As for the recording member, a sheet member may also be used in place of that in form of a roll.

As explained above, the ink receiving layer formed on the recording face of the recording member according to the present invention improves properties of the layer, such as mechanical strength, water resistance, solvent resistance, durability, etc. by applying an energy for curing the ink receiving layer, such as projection of a radiation ray, an electron beam, or application of heat, and the like. Furthermore, the application of such an energy promotes fixing of the ink.

Thus, according to the present invention the formed image can be produced in high quality without causing peel-off, and can be used for overhead projector as an original.

Details of two particular examples will now be given.

#### 35 Example 1

In this first example, the ink-receiving layer is a film of polyvinylalcohol (PVA-220 manufactured by Kuraray, Japan) which is coated on 100 um of base film of polyethyleneterephthalate. An image is printed thereon with an ink having the following composition.

40	Water	5 parts by weight	40
	Diethyleneglycol	15 parts by weight	
	Polyethyleneglycol #200	10 parts by weight	
45	Dye	2 parts by weight	45

The ink-receiving layer, thus printed, is heated, and by this heating, a hydroxyl group of the PVA ink-receiving layer is etherified and the printed layer thereby cured.

#### 50 Example II

In this second example an ink-receiving layer is a film of Kodak Photoresist (Eastman Kodak KPP) which is coated on a Polyethyleneterephthalate base film as in Example I. An image is printed thereon with an ink also having the composition as detailed in Example I.

The ink-receiving layer, thus printed, is irradiated with ultra-violet rays and thereby cured.

#### CLAIMS

1. A recording device which comprises an image forming means for forming images with ink on a recording member having an ink receiving layer and an energy applying means for curing said ink receiving layer after forming the image thereon.

2. A recording device according to Claim 1 wherein the energy applying means is a heating means.

3. A recording device according to Claim 1 wherein the energy applying means is a radiation irradiating means.

4. An image recording method in which an image is formed on a recording member having a curable

layer, the image formation involving applying a recording material to said layer, and in which after image formation the curable layer is subjected to a curing process.

5. An image recording method according to claim 4 in which the recording material is a liquid.
6. An image recording method according to claim 5 in which the liquid recording material is an ink.
- 5 7. A recording device substantially as herein before described with reference to Figure 1 of the accompanying drawings. 5
8. A recording device substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.
9. An image recording method substantially as hereinbefore described with reference to Figure 1 of the accompanying drawings. 10
- 10 10. An image recording method substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings. 10
11. A recording device according to claim 7 or claim 8 further substantially as hereinbefore described with reference to either of the foregoing Examples I and II.
- 15 12. An image recording method according to claim 9 or claim 10 further substantially as hereinbefore described with reference to either of the foregoing Examples I and II. 15

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